NOAA Fleet Update

November 2016

The following update provides the status of NOAA's fleet of ships and aircraft, which play a critical role in the collection of oceanographic, atmospheric, hydrographic, and fisheries data. NOAA's current fleet of 16 ships – the largest civilian research and survey fleet in the world – and nine aircraft, are operated, managed, and maintained by NOAA's Office of Marine and Aviation Operations (OMAO). OMAO includes civilians, mariners, and officers of the United States NOAA Commissioned Officer Corps (NOAA Corps), one of the nation's seven Uniformed Services.

Find us on Facebook for the latest news and activities.

Table of Contents

Please click on the Table of Contents entry below to be taken directly to a specific ship, center, aircraft, asset, program, or information. The fleet is listed based on the geographical location of their homeport/base starting in the Northeast and ending in the Pacific.

OMAO and the NOAA Corps – In the News **4**
NOAA P-3 Completes Service Life Extension **6**
NOAA Fleet Plan **7**
NOAA Basic Officer Training (BOTC) **8**
OMAO's Ships and Centers **9**
New Castle, NH **9**
NOAA Ship *Ferdinand R. Hassler* 9

Newport, RI **9**
NOAA Ship *Henry B. Bigelow* 9

Davisville, RI **10**
NOAA Ship *Okeanos Explorer* 10

Norfolk, VA **10**
NOAA Ship *Thomas Jefferson* 10
OMAO'S MARINE OPERATIONS CENTER – ATLANTIC (MOC-A) 10

Charleston, SC **11**
NOAA Ship *Nancy Foster* 11
NOAA Ship *Ronald H. Brown* 11

Pascagoula, MS **11**
NOAA Ship *Pisces* 11
NOAA Ship *Oregon II* 12
NOAA Ship *Gordon Gunter* 12

San Diego, CA **12**
NOAA Ship *Reuben Lasker* 12

Newport, OR **12**
NOAA Ship *Rainier* 12
NOAA Ship *Bell M. Shimada* 13
OMAO'S MARINE OPERATIONS 13
OMAO'S MARINE OPERATIONS CENTER – PACIFIC (MOC-P) 13

Ketchikan, AK **13**
NOAA Ship *Fairweather* 13

Kodiak, AK **14**
NOAA Ship *Oscar Dyson* 14

Honolulu, HI **14**
NOAA Ship *Hi'ialakai* 14
NOAA Ship *Oscar Elton Sette* 14
OMAO'S MARINE OPERATIONS CENTER – PACIFIC ISLANDS (MOC-PI) 14

OMAO's Aircraft **15**
Tampa, Florida ***15***
WP-3D (N42RF) – "Hurricane Hunter" 15
WP-3D (N43RF) – "Hurricane Hunter" 15
Jet Prop Commander (N45RF) 15
Gulfstream IV (N49RF) 15
Twin Otter (N46RF) 16
King Air (N68RF) 16
Twin Otter (N48RF) 16
Twin Otter (N56RF) 16
Twin Otter (N57RF) 16
OMAO'S AIRCRAFT OPERATIONS CENTER (AOC) 17

Unmanned Systems Support **18**
NASA Global Hawk ***18***
APH-22 Hexacopter ***18***

OMAO Partnerships **20**
United States Senate Committee on Commerce, Science, and Transportation ***20***
National Science Foundation ***20***
Department of Defense - U.S. Pacific Command (USPACOM) ***20***
Department of Defense - U.S. Navy ***20***
Department of Homeland Security - U.S. Coast Guard ***21***

Teacher at Sea Program **22**
OMAO - NOAA Dive Program **23**
OMAO Small Boat Program **24**
Office of Marine and Aviation Operations **25**
NOAA Commissioned Officer Corps **27**

OMAO and the NOAA Corps – In the News

Thousands evacuate across Caribbean in advance of Matthew

-Miami Herald

As Hurricane Matthew's outer bands began pounding Jamaica and southwest Haiti Monday, Caribbean countries raced to finish preparations and evacuate residents from vulnerable areas...In an effort to improve computer models forecasting Matthew's future track, hurricane hunter flights that investigate the storm are being increased to every six hours. A G-IV capable of high-altitude missions will also be making twice daily flights to gather information around and in advance of Matthew, said hurricane center spokesman Dennis Feltgen. Local weather offices are also increasing the release of weather balloons to collect information every six hours, he said. "There's a lot of balls up in the air right now," he said. "So we're going to get as much data as we can into these models."

Hawaii May Finally Get An Accurate Count Of Its Bottomfish

- Civil Beat

State and federal fishery officials have struggled for decades to determine how many deep-sea bottomfish like onaga and opakapaka are in Hawaiian waters, basing stock assessments on the amount of groupers and snappers caught by commercial fishermen. The method has made it difficult to assess the health of the fishery and what limits to set on the amount of bottomfish that can be reeled in each year, which affects whether these popular fish appear on the menu and how much they cost if they do.

Landmark weather satellite ready for launch after Hurricane Matthew wrecks pad

-Palm Beach Post

Clunky, aging weather satellites relied on to save lives when hurricanes threaten will be near obsolete when the long-anticipated GOES-R satellite makes a historic launch next month. GOES-R, a next-generation weather satellite is NOAA's biggest advancement in weather forecasting to date, and will provide National Weather Service forecasters with the meteorological equivalent of going from black and white to ultra-high-definition color T.V....Jack Bevan, a senior hurricane specialist for the National Hurricane Center stressed the satellite data is just one part of the intensity estimation process and cannot replace the reconnaissance aircraft that gather information from the heart of the storm. "The computer is good at computing data, but it's not as good as looking at cloud patterns as the human eye," Bevan said at the Orlando conference. "This will not put the Hurricane Hunters out of business..."

Before and after the North Carolina floods

-CNN

Before Hurricane Matthew, eastern North Carolina had already seen damaging flooding from heavy rainfall. With 10 to 15 inches more inches of rain from Matthew, the situation escalated to the worst flooding North Carolina has seen since Hurricane Floyd in 1999. At least 24 people have died in the state as a result of the storm. To help rescuers on the ground get a better idea the situation, the National Oceanic and Atmospheric Administration, NOAA, flew over the hardest-hit areas to photograph the flooding. To view the damage, grab the center bar in each set of photos and drag left or right to compare images from before and after the flood...

Weather forecasters can't manipulate hurricane warnings -- here's why

-Government Computer News (Op-Ed by David Titley)

Many mini-dramas develop during major disasters like Hurricane Matthew, which has left a trail of devastation in the Caribbean and the southeastern United States. One such drama occurred outside of the storm zone: Conservative news blogger Matt Drudge accused the federal government of hyping the threat to the U.S. coast, purportedly to play up possible links between extreme weather and climate change...In the pre-internet era, hurricane forecasting was more of an art than a science. Modern weather forecasting developed in the 1960s with the advent of radar, computers and satellites...Today global weather models from the United States, Canada, United Kingdom and the European Centre for Medium Range Weather Forecasting are available to anyone with an internet connection. When the NHC directs U.S. Air Force Reserve personnel or NOAA "Hurricane Hunters" to fly a hurricane reconnaissance mission, the data they collect are posted virtually in real time. Satellite images from the JTWC or NHC forecast are available online free of charge...

NOAA P-3 Completes Service Life Extension

NOAA recently completed a service life extension program (SLEP) for its first of the two P-3 aircraft extending their service life to 2030. NOAA received funding in 2013 for this SLEP through the Disaster Relief Appropriations Act. The first P-3 SLEP was completed in October 2016 and the second will begin February, 2017.

NOAA's aircraft are national assets: highly mobile and responsive to national emergencies, such as hurricane and flooding events. They collect data that support the protection of life, property, and the economic health of the Nation as multi-mission capable platforms, most recently conducting research and reconnaissance during Hurricane Matthew, and working with FEMA to assess coastal and inland flooding after the storm.

NOAA Fleet Plan

The NOAA Fleet Plan: Building NOAA's 21st Century Fleet

The National Oceanic and Atmospheric Administration (NOAA) has developed a comprehensive plan to recapitalize NOAA's fleet of research and survey vessels based on an extensive analysis of NOAA's current and future at-sea data collection requirements. That analysis, validated by independent experts, indicates that, absent investments in new research and survey ships, there will be long-term impacts to NOAA's ability to provide products and services such as weather forecasts and warnings, nautical charts, accurate fishery quotas and stock assessments, harmful algal bloom warnings, climate outlooks, emergency response, and numerous other management activities. *The NOAA Fleet Plan: Building NOAA's 21st Century Fleet* provides a detailed plan for ensuring that NOAA's ship fleet can continue to efficiently and effectively fulfill its mission to collect data vital to protecting lives, livelihoods, and conserving and managing natural resources.

NOAA Basic Officer Training (BOTC)

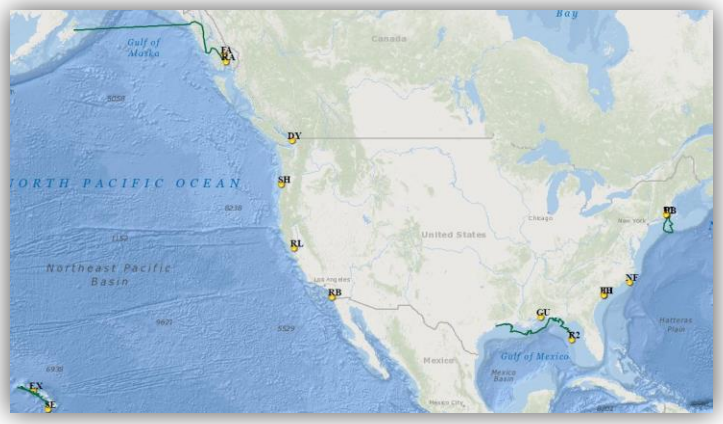
Class 128

BOTC 128 recently earned Senior Status. This phase of the program is geared toward preparing the Officer Candidates for serving as Junior Officers in the fleet. With Senior Status comes increased levels of responsibility- students are expected to hold themselves to the highest standards of performance, as they will for their entire careers. In addition the Officer Candidates were also given their first sea assignments at billet night.

Ololade N. Ajilore	NOAA Ship *Gordon Gunter*, Pascagoula, Mississippi
Hunter L. Brendel	NOAA Ship *Pisces,* Pascagoula, Mississippi
Sydney M. Catoire	NOAA Ship *Thomas Jefferson*, Norfolk, Virginia
Sean E. Digre	NOAA Ship *Bell M. Shimada,* Newport, Oregon
Chirsotpher K. Dunn	NOAA Ship *Rainier,* Newport, Oregon
Garrison L. Grant	NOAA Ship *Thomas Jefferson,* Norfolk, Virginia
Timothy J. Holland	NOAA Ship *Oscar Elton Sette,* Honolulu, Hawaii
Patrick T. Lawler	NOAA Ship *Fairweather,* Ketchikan, Alaska
Vanessa C. Oquendo	NOAA Ship *Oscar Dyson*, Kodiak, Alaska
Brianna D. Pacheco	NOAA Ship *Okeanos Explorer*, Davisville, Rhode Island
Chelsea L. Parrish	NOAA Ship *Oregon II*, Pascagoula, Mississippi
Lee T. Shoemaker	NOAA Ship *Henry B. Bigelow*, Newport, Rhode Island
Peter R. Siegenthaler	NOAA Ship *Fairweather*, Ketchikan, Alaska
Brandon W. H. Tao	NOAA Ship *Nancy Foster,* Charleston, South Carolina
Collin H. Walker	NOAA Ship *Rainier*, Newport, Oregon

OMAO's Ships and Centers

OMAO's Ship Tracker (screen shot below) shows information about the location - present and past - of our fleet of research and survey ships. Please note: To access Ship Tracker you must create an account with a **.gov** or **.mil** email address. All other access is restricted.



OMAO's ships and related Marine Centers are listed below based on the geographical location of the vessels' homeports starting in the Northeast and ending in the Pacific.

New Castle, NH

NOAA Ship *Ferdinand R. Hassler*

Commanding Officer: LCDR Matthew Jaskoski
Primary Mission Category: Hydrographic Surveys
DEPART: Charleston, South Carolina **ARRIVE:** Charleston, South Carolina
DEPART: Charleston, South Carolina **ARRIVE:** New Castle, New Hampshire

Project 1: Approaches to Wilmington
Objective: To support safe navigation through the acquisition and processing of hydrographic survey data for updating nautical charts and by the identification and dissemination of dangers to navigation, as identified during the course of survey operations.

Project 2: Benthic Habitat Assessment of the Northeast Continental Shelf Ecosystems
Objective: Characterize offshore benthic habitats that fall within Bureau of Ocean Energy Management designated New Jersey Wind Energy Areas, and develop benthic habitat maps, models, and other data products that can be used to improve NEFSC's analytical and decision-making capabilities with respect to offshore energy siting and monitoring, improved essential fish habitat definition, and data in support of conventional and alternative fisheries management strategies in the mid-Atlantic.

Newport, RI

NOAA Ship *Henry B. Bigelow*

Commanding Officer: CDR Jeff Taylor
Primary Mission Category: Fisheries Research
DEPART: Newport, RI **ARRIVE:** Newport, Rhode Island
DEPART: Newport, RI **ARRIVE:** Newport, Rhode Island

Project 1: Autumn Bottom Trawl and Acoustic Survey
Objectives: Determine the autumn distribution and relative abundance of fish and invertebrate species found on the continental shelf and upper slope, including the collection of additional biological information following the pre-established

sampling plan at the direction of the Chief Scientist. Opportunistically evaluate survey gear efficiency, methods, or survey related equipment that may benefit the trawl survey and fish stock assessments. Collect oceanographic data including conductivity, temperature, and depth casts and bongo tows at selected stations. Opportunistically collect acoustic data along cruise tracks with the EK-60 and ME-70 acoustic systems.

Project 2: Bottom Trawl Survey Gear Trails
Objective: Project objectives are to determine the effects the NOAA Ship *Henry B. Bigelow's* autotrawl winch system has on the physical and biological performance of the Northeast Fisheries Science Center (NEFSC) standard survey bottom trawl gear; and collect underwater video observations of the NEFSC standard survey bottom trawl gear.

Davisville, RI

NOAA Ship *Okeanos Explorer*

Commanding Officer: CAPT Mark Wetzler
Primary Mission Category: Oceanographic Exploration and Research
Ship Status: Vessel will be in scheduled dry dock for scheduled maintenance, winter repairs, scientific data processing, crew rest, and training.

NOAA Ship *Okeanos Explorer*, seen here from the camera of an "ROV," a remotely operated underwater vehicle, just as it breached the surface of the ocean.
Photo: [NOAA]

Norfolk, VA

NOAA Ship *Thomas Jefferson*

Commanding Officer: CDR Christiaan van Westendorp
Primary Mission Category: Hydrographic Surveys
DEPART: Charleston, South Carolina **ARRIVE:** Norfolk, Virginia

Project: Approaches to Savannah
Objective: To support safe navigation through the acquisition and processing of hydrographic survey data for updating nautical charts and by the identification and dissemination of dangers to navigation, as identified during the course of survey operations.

OMAO'S MARINE OPERATIONS CENTER – ATLANTIC (MOC-A)

CAPT Scott Sirois, Commanding Officer MOC-A
MOC-A serves as a homeport for one NOAA ship, and manages the day-to-day operations and provides administrative, engineering, maintenance, and logistical support for the research and survey ships in NOAA's Atlantic fleet. Each year these ships conduct dozens of missions to assess fish and marine mammal stocks, conduct coral reef research, collect seafloor data to update nautical charts, and explore the ocean.

Charleston, SC

NOAA Ship *Nancy Foster*

Commanding Officer: Master Donn Pratt
Primary Mission Category: Oceanographic Research, Environmental Assessment
Depart: Morehead City, North Carolina **Arrive:** Charleston, South Carolina
Depart: Charleston, South Carolina **Arrive:** Cape Canaveral, Florida

Project 1: Benthic Habitat Characterization
Objectives: Collect high resolution multi-beam data in depths approximately 10 to 300 meters so as to continue to characterize seafloor habitats and cultural resources in support of the expansion of MNMS, including hard bottom seafloor habitats, shipwrecks, sand shoals and ridges, and validate seafloor habitat types and shipwrecks using drop cameras from small boats.

Project 2: Miami ODMDS SPI/PCB Survey
Objectives: Under the Marine Protection, Research, and Sanctuaries Act (MPRSA), it is the U.S. Environmental Protection Agency's mission to manage Ocean Dredged Material Disposal Sites (ODMDSs) to ensure that the ocean disposal of dredged material does not adversely impact human health or the marine environment. There are two objectives to this survey: 1) map the disposal mound and apron of the 2013-15 disposal event to determine the effectiveness of the new release zone on keeping disposed material within the ODMDS boundaries; 2) determine if the disposal of 5 million cubic yards of new work material remediated the elevated copper and PCB sediment concentrations.

NOAA Ship *Ronald H. Brown*

Commanding Officer: CAPT Robert Kamphaus
Primary Mission Category: Oceanographic Research, Environmental Assessment
Depart: San Diego, California **Arrive:** Easter Island, Chile

Project: P18 GO-SHIP/CO2 Repeat Hydro
Objectives: This project will be a decadal reoccupation of repeat hydrography section P18 jointly funded by NOAA-COD/CPO (Climate Observation Division of the Climate Program Office) and NSF-OCE (National Science Foundation Division of Ocean Sciences) as part of the Global Ocean Ship-Based Hydrographic Investigation Program, or GO-SHIP/CO2/hydrography/tracer program. Academic institutions and NOAA research laboratories will participate. GO-SHIP focuses on the need to monitor inventories and transports of CO2, heat, and freshwater in the ocean. The program serves to constrain long term changes and variability in marine biogeochemical and physical processes in response to natural and human-induced forcing. The program provides unique high-quality measurements of key oceanographic parameters at all ocean depths.

Pascagoula, MS

NOAA Ship *Pisces*

Commanding Officer: CDR William Mowitt
Primary Mission Category: Fisheries Research
DEPART: Boston, Massachusetts **ARRIVE:** Newport, Rhode Island
DEPART: Newport, Rhode Island **ARRIVE:** Pascagoula, Mississippi

Project: Gulf of Maine Harmful Algal Bloom Forecast
Objectives: *Alexandrium fundyense*, commonly referred to locally as the New England "red tide" organism, is a Harmful Algal Bloom (HAB) species that requires careful management of shellfish resources to prevent Paralytic Shellfish Poisoning (PSP) in New England and Canadian coastal waters. This algae species produces cysts that overwinter in the sediments of the Gulf of Maine. The abundance of these cysts in the sediment during the fall and winter is a strong predictor of the magnitude of HAB bloom events during the following year. During this cruise, sediment cores will be collected and samples preserved to allow for the enumeration of *A. fundyense* cysts across a broad area of the Gulf of Maine in support of an accurate prediction of the potential red tide conditions along the northern New England coasts.

NOAA Ship *Oregon II*

Commanding Officer: Master Dave Nelson
Primary Mission Category: Fisheries Research
DEPART: Pascagoula, Mississippi **ARRIVE:** Pascagoula, Mississippi

Project: SEAMAP Fall Groundfish
Objectives: Sample the northern Gulf of Mexico (GOM) with Southeast Area Monitoring and Assessment Program (SEAMAP) standard trawl sampling gear to determine the abundance and distribution of benthic fauna.

NOAA Ship *Gordon Gunter*

Commanding Officer: LCDR Lindsay Kurelja
Primary Mission Category: Fisheries Research
DEPART: Pascagoula, Mississippi **ARRIVE:** Pascagoula, Mississippi

Project: Fall Pelagic Trawl/Acoustic Survey
Objectives: Sample the northern Gulf of Mexico with 90 ft high-opening fish trawl to determine the abundance and distribution of benthopelagic fauna species. The project will collect size measurements to determine population size structure, and collect biological samples of selected species.

San Diego, CA

NOAA Ship *Reuben Lasker*

Commanding Officer: CDR Kurt Dreflak
Primary Mission Category: Fisheries Research

Ship Status: Dry Dock & Winter Repair Period. Vessel will be in scheduled dry dock at Mare Island Dry Dock for scheduled maintenance, winter repairs, scientific data processing, crew rest, and training.

NOAA Ship *Reuben Lasker* recently wrapped up a project that utilizes the seabed AUV platform to map the benthic habitat of the Channel Islands.
[Photo: NOAA]

Newport, OR

NOAA Ship *Rainier*

Commanding Officer: CAPT E.J. van den Ameele
Primary Mission Category: Hydrographic Surveys
DEPART: Kodiak, Alaska **ARRIVE:** Seattle, Washington

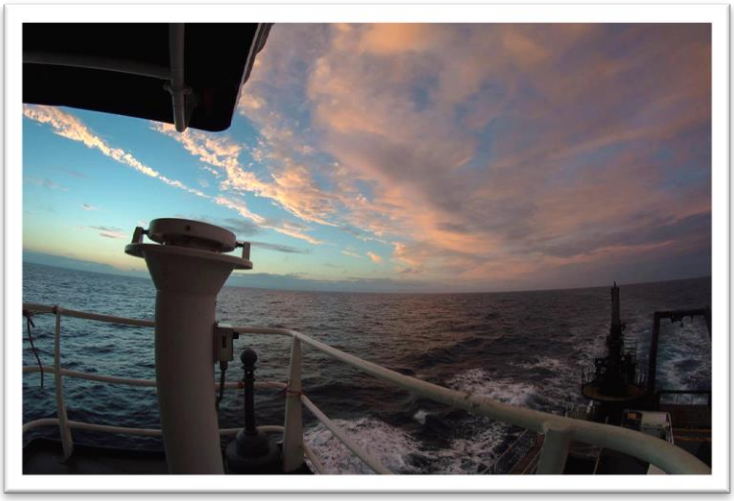
Project: North Coast of Kodiak Island

Objective: To support safe navigation through the acquisition and processing of hydrographic survey data for updating nautical charts and by the identification and dissemination of dangers to navigation, as identified during the course of survey operations.

NOAA Ship *Bell M. Shimada*

Commanding Officer: CDR Paul Kunicki
Primary Mission Category: Fisheries Research

Ship Status: Alongside winter repair period. Vessel will be alongside in Newport, Oregon for scheduled maintenance, winter repairs, scientific data processing, crew rest, and training.



NOAA Ship *Bell M. Shimada* underway from Aft Bridge Wing.
[Photo: NOAA]

OMAO'S MARINE OPERATIONS

CAPT Todd Bridgeman, Director of Marine Operations
OMAO's Marine Operations over-sees operations of the three regional Centers, including the Marine Operations Center-Pacific, Marine Operations Center-Atlantic, and Marine Operations Center-Pacific Islands.

OMAO'S MARINE OPERATIONS CENTER – PACIFIC (MOC-P)

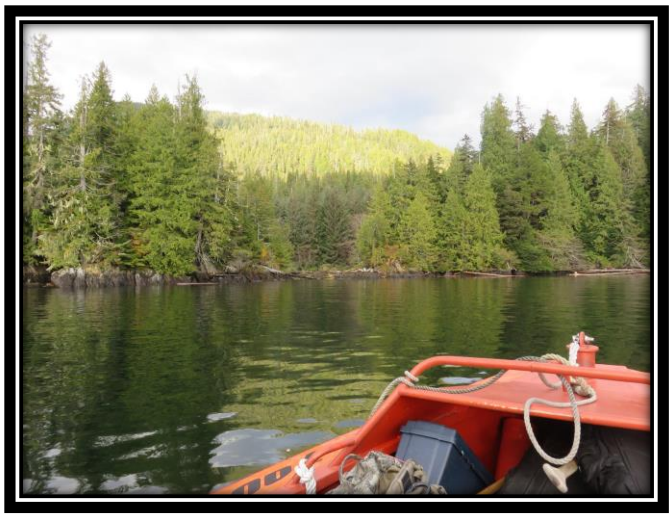
CDR Brian Parker, Commanding Officer MOC-P
MOC-P serves as a homeport for two NOAA ships, and manages the day-to-day operations and provides administrative, engineering, maintenance, and logistical support for the research and survey ships in NOAA's Pacific fleet. Each year these ships conduct dozens of missions to assess fish and marine mammal stocks, conduct coral reef research, collect seafloor data to update nautical charts, and explore the ocean.

Ketchikan, AK

NOAA Ship *Fairweather*

Commanding Officer: CDR Mark Van Waes
Primary Mission Category: Hydrographic Surveys
DEPART: Ketchikan, Alaska **ARRIVE:** Seattle, Washington

Project: Southeast Alaska
Objective: To support safe navigation through the acquisition and processing of hydrographic survey data for updating nautical charts and by the identification and dissemination of dangers to navigation, as identified during the course of survey operations.



NOAA Ship *Fairweather's* small boats conduct reconnaissance for establishing the station for their survey of Alaska's Behm Canal.
[Photo: NOAA]

Kodiak, AK

NOAA Ship *Oscar Dyson*

Commanding Officer: CDR Michael Levine
Primary Mission Category: Fisheries Research

Ship Status: Dry Dock & Winter Repair Period. Vessel will be in scheduled dry dock in Bellingham, Washington for scheduled maintenance, winter repairs, scientific data processing, crew rest, and training.

Honolulu, HI

NOAA Ship *Hi'ialakai*

Commanding Officer: CAPT Elizabeth Kretovic
Primary Mission Category: Oceanographic Research, Environmental Assessment

Ship Status: Dry Dock & Winter Repair Period. Vessel will be in scheduled dry dock in Bellingham, Washington for scheduled maintenance, winter repairs, scientific data processing, crew rest, and training.

NOAA Ship *Oscar Elton Sette*

Commanding Officer: CDR Donald Beaucage
Primary Mission Category: Fisheries Research
DEPART: Pearl Harbor, Hawaii **ARRIVE:** Pearl Harbor, Hawaii

Project: Insular Bottomfish Survey
Objectives: Support the first operational survey of Deep-7 bottomfish stock across the Main Hawaiian Islands using the Modular Optical Underwater Survey System (MOUSS) fishery-independent sampling gear. The MOUSS builds and improves upon previous efforts with the Baited Stereo-Video Bottom Camera System (BotCam), which has been effectively used to collect fishery-independent species-specific size-structured abundance data on bottomfish in the Main Hawaiian Islands.

OMAO'S MARINE OPERATIONS CENTER – PACIFIC ISLANDS (MOC-PI)

CDR Matthew Wingate, Commanding Officer MOC-PI
MOC-PI serves as a homeport for two NOAA ships, and manages the day-to-day operations and provides administrative, engineering, maintenance, and logistical support for the ships in NOAA's Pacific Islands' fleet.

OMAO's Aircraft

Tampa, Florida

WP-3D (N42RF) – "Hurricane Hunter"

Current Mission: Equipment installation and instrumentation - Until December 2016

The aircraft re-wing and paint is complete! Aircraft is back at MacDill Air Force Base and is being configured for survey operations. First project scheduled for FY17 is Ocean Winds in January.

WP-3D (N43RF) – "Hurricane Hunter"

Current Mission: 2016 Hurricane Season - June through November 2016

The NOAA WP-3D Hurricane Hunter aircraft is ready to respond. Radar reconnaissance missions on the NOAA WP-3D aircraft will be conducted to support tropical cyclone forecasting and the Hurricane Forecast Improvement Project. These flights will use the WP-3D's tail Doppler radar system to obtain high-density, three-dimensional measurements of the inner core wind structure of each tropical cyclone, potentially throughout its full life cycle. The hurricane research missions will also use the WP-3D to support the calibration/validation of satellite measurements and instrumentation development for the tropical cyclone environment and sampling of other aspects of the tropical cyclone inner core. These measurements will be used to enhance the accuracy of track and intensity guidance generated by NOAA's numerical weather prediction models. They will also be used directly by NOAA's National Weather Service hurricane specialists with the ultimate outcome being improved accuracy of intensity and track forecasts, extended forecast/warning lead-times and improved confidence levels by decision makers.

Jet Prop Commander (N45RF)

Temporary Base: Various locations

Current Mission: Soil Moisture Surveys

NOAA aircraft use specialized detection equipment to make accurate, real-time measurements of soil moisture content across the country. This information is critical for managers and others to make optimal decisions supporting river, flood, and water supply forecasting, agriculture and forest management, recreation and winter tourism, and the commerce, industry, and transportation sectors of the Nation's economy. The benefits of accurate soil moisture measurements are immense and NOAA aircraft are uniquely capable to provide this information.

Gulfstream IV (N49RF)

Current Mission: 2016 Hurricane Season - June through November 2016

NOAA's Gulfstream IV aircraft will support operational tropical cyclone forecasting and the Hurricane Forecast Improvement Project. The G-IV will be the primary aircraft for surveillance missions with the Air Force's WC-130J and NOAA's WP-3D aircraft serving as backup platforms. The radar reconnaissance missions will use the G-IV's Tail Doppler Radar (TDR) system to obtain high-density, three-dimensional measurements of the inner core wind structure of tropical cyclones, potentially throughout its full life cycle. NOAA's National Weather Service is seeking to gather data on the performance of the TDR observation system and will work with the Hurricane Research Division to develop observing strategies for maximizing the utility of the TDR with the goal of improving hurricane track and intensity forecasts.

Twin Otter (N46RF)

Temporary Base: Various Locations
Current Mission: Soil Moisture Survey

NOAA aircraft use specialized detection equipment to make accurate, real-time measurements of soil moisture content across the country. This information is critical for managers and others to make optimal decisions supporting river, flood, and water supply forecasting, agriculture and forest management, recreation and winter tourism, and the commerce, industry, and transportation sectors of the Nation's economy. The benefits of accurate soil moisture measurements are immense and NOAA aircraft are uniquely capable to provide this information.

King Air (N68RF)

Temporary Base: Various locations
Current Mission: Continuous Coastal Mapping

Coastal Mapping is an on-going mission of NOAA's National Geodetic Survey (NGS) to survey approximately 95,000 miles of United States coastline providing the Nation with an accurate, up-to-date and seamless database of the national shoreline. This data is used as the baseline for defining America's marine territorial limits, including its Exclusive Economic Zone, and for the geographic reference needed to manage coastal resources and support marine navigation. Stereo photogrammetry and LiDAR are used to produce a digital database. In addition, the Coastal Mapping Program supports NOAA's homeland security and emergency response requirements by rapidly acquiring and disseminating a variety of datasets to federal, state, and local government agencies as well as the general public.

Twin Otter (N48RF)

Temporary base: Various locations
Current Mission: Coastal Mapping LiDAR

The TopoBathy Lidar mission will collect data in the coastal zone used to produce the most up-to-date and accurate marine navigation charts, FEMA flood plain and inundation maps, and other Integrated Ocean and Coastal Mapping (IOCM) applications. Data gathered will help ensure safe and efficient marine transportation and benefit coastal communities with accurate resource management and aid emergency response efforts.

Twin Otter (N56RF)

Current Mission: Scheduled Maintenance

The aircraft will be in scheduled maintenance (corrosion inspection) through the end of January.

Twin Otter (N57RF)

Temporary base: Monterey, California
Current Mission: Northeast and Southeast AMAPPS.

The aircraft will be supporting the NMFS Atlantic Marine Assessment Program for Protected Species (AMAPPS) project on the east coast of the US. This survey helps to develop models and tools to provide seasonal density estimates incorporating habitat characteristics of marine mammals, turtles, and seabirds in the western North Atlantic Ocean. The project will provide data essential to supporting conservation initiatives mandated under the National Environmental Policy Act (NEPA), Marine Mammal Protection Act (MMPA), Migratory Bird Treaty Act (MBTA), and Endangered Species Act (ESA).

OMAO'S AIRCRAFT OPERATIONS CENTER (AOC)

CAPT Michael Silah, Commanding Officer AOC

The AOC, located at MacDill Air Force Base in Tampa, Florida, serves as the main base for OMAO's fleet of nine aircraft and provides capable, mission-ready aircraft and professional crews to the scientific community. Whether studying global climate change or acid rain, assessing marine mammal populations, surveying coastal erosion, investigating oil spills, flight checking aeronautical charts, or improving hurricane prediction models, the AOC flight crews continue to operate in some of the world's most demanding flight regimes.

NOAA's refurbished P-3 with new paint job.
[Photo: CDR Scott Price/NOAA]

Unmanned Systems Support

NASA Global Hawk

Location: Edwards Airforce Base
Mission: Scheduled Inspection and Maintenance

After returning to Edwards in October NASA 872 continued operations over Hurricane Matthew. No small effort as ground and flight crews were rounded up to complete the final three flights. Currently NASA 872 is under phase inspection maintenance and NASA 874 (block 10) is in the process of being retrofitted for NASA missions. Mission plans are being developed for the Fall 2017 missions in the Pacific.

APH-22 Hexacopter

Location: Livingston Island, Antarctica
Mission: Antarctic Field Operations

The NOAA National Marine Fisheries Service, Southwest Fisheries Science Center (SWFSC) in partnership with the Antarctic Ecosystem Research Division (AERD) seeks to use the APH-22 hexacopter to measure wildlife response to UAVs, continue previous year's pinnipeds surveys, and fly colony-wide census flights to monitor penguin chick production. Information gathered from these flights will ensure that UAS best practices are developed as to not cause undue stress to wildlife during breeding and non-breeding periods. Aerial pinniped surveys will prevent the drugging and capture of animals to gather mass, size, and shape data. Colony wide penguin flights will be used to calculate abundance and trends of chick populations.

Location: Atlantic Northeast
Mission: Emergency Response Turtles and Seals

The North East Fisheries Science Center (NEFSC) seeks to use the APH-22 hexacopter to respond to entanglements and other unplanned situations involving marine mammals. Photographs will be collected for the purpose of aiding emergency stranding response, event documentation, and photo ID. UAS technologies will also be used to conduct surveys for marine turtles. The intent is to assess the feasibility of using small unmanned rotorcraft to search for turtles in their marine environment both at surface and subsurface. Turtles that are discovered either by the APH-22 or by on-vessel observers will be photographed by the APH-22 and then tagged and or sampled as part of an ongoing study. Turtles may be photographed post-release with the APH-22 to document post-release behavior. NEFSC will also use the APH-22 to conduct surveys of seal haulout sites. Photographs will be collected for the purpose of obtaining local population numbers, documenting seals with evidence of fishery interactions, and collecting photo ID data of seals with brands, wounds, and other distinguishing marks.

Location: Pribilof Islands, Alaska
Mission: Pribilof Fur Seals

The National Marine Fisheries Service (NMFS), Marine Mammal Laboratory (MML) seeks to utilize the APH-22 Hexacopter to photograph northern fur seal rookeries in the Pribilof Islands: St Paul, St. George, Otter, and Walrus Island. The Eastern Pacific northern fur seal stock is managed by NMFS and listed as depleted under the Marine Mammal Protection Act. Photographic survey flights will be flown above the targeted animals at a height of 100 feet. The captured images will be used to update historical photographs of rookery spaced used by northern fur seals. Additionally, opportunistic surveys of Steller sea lions will be collected to gather population data and catalog permanent markings of individuals.

MD4-1000/DJI S-1000

Location: Corryton, Tennessee

Mission: Training and Operational Development

NOAA's Air Resources Laboratory, Atmospheric Turbulence and Diffusion Division (NOAA/ARL/ATDD) seeks to utilize the NOAA National Marine Fisheries Center for Cooperative Unmanned Technologies (NOAA/NMFS/CCUT) MD4-1000 and DJI S-1000 airframes to perform instrument testing to verify its performance prior to the upcoming VORTEX-SE 2017 field study. Two iMet-XQ temperature/pressure/relative humidity sensors will be flown on the MD4-1000 for inter-comparison with the existing DJI S-1000 platform.

SenseFly eBee RTK

Location: Corbin, Virginia – Catlett, Virginia

Mission: Training and Operational Development

The Remote Sensing Division (RSD) and the Office of National Marine Sanctuaries (ONMS) have been funded to operate the SenseFly eBee RTK to further the development of UAS operational procedures specifically related to coastal and habitat mapping, living marine resource surveys, as well as a range of emergency preparation, response and recovery requirements. The project consists of the initial acquisition, flight training and system acceptance. Upon completion of the training/system acceptance segment several operational missions will take place during the fall to begin the development of procedures and protocols for integrating eBee operations and data collection into existing RSD and ONMS programs.

Coyote

Mission: Storm and Clear Air Flights

The Coyote, built by Sensintel now Raytheon, is a small electric-powered unmanned aircraft with 1-3 hour endurance and capable of carrying a 1-2lb payload. The Coyote can be launched from a P-3 sonobuoy tube in flight, and terrain-permitting, is capable of autonomous landing and recovery. The Coyote, when deployed from NOAA's P-3's within a hurricane environment, will prove to be a unique observation platform from which the low level atmosphere and boundary layer environment can be studied in great detail.

OMAO Partnerships

United States Senate Committee on Commerce, Science, and Transportation

Location: Washington, DC
Detail: LCDR Wendy Lewis, NOAA Commissioned Officer Corps

LCDR Lewis is currently on detail to the Committee with the staff of the Chair, Senator John Thune (R-SD), where she is assisting on activities pertaining to oceans, atmosphere, and fisheries policy, as well as other matters within the Committee's jurisdiction.

National Science Foundation

Location: Antarctica
Mission: LT Rafael Klein, NOAA Commissioned Officer Corps

Members of the NOAA Commissioned Officer Corps carry out NOAA's mission in remote locations across the globe. LTJG Klein is assigned to Antarctica where he serves as the Station Chief for NOAA's Atmospheric Research Observatory (ARO) at the Amundsen-Scott South Pole Station. The ARO at the Amundsen-Scott South Pole Station is a National Science Foundation facility used in support of scientific research related to atmospheric phenomena.

Department of Defense - U.S. Pacific Command (USPACOM)

Location: Honolulu, Hawaii
Embedded Liaison: CAPT Barry Choy, NOAA Commissioned Officer Corps

The U.S. Pacific Command (USPACOM) area of responsibility encompasses approximately half the earth's surface and more than half of its population. The 36 nations that comprise the Asia-Pacific include: two of the three largest economies and nine of the ten smallest; the most populous nation; the largest democracy; the largest Muslim-majority nation; and the smallest republic in the world. The region is a vital driver of the global economy and includes the world's busiest international sea lanes and nine of the ten largest ports. By any meaningful measure, the Asia-Pacific is also the most militarized region in the world, with seven of the world's ten largest standing militaries and five of the world's declared nuclear nations. Under these circumstances, the strategic complexity facing the region is unique. CAPT Choy is linked closely with the activities within the region allowing for identification of opportunities and cooperation between USPACOM and NOAA, and better overall government function situational awareness in the region.

Department of Defense - U.S. Navy

Location: Washington, DC
Embedded Liaison: LCDR Jason Mansour, NOAA Commissioned Officer Corps

LCDR Jason Mansour serves as NOAA liaison to the Oceanographer of the Navy and is an important interface between the U.S. Navy and other U.S. federal agencies, including NOAA. As NOAA Liaison, LCDR Jason Mansour serves as the Head of the Interagency Policy Branch of the International and Interagency Policy Division, Office of the Oceanographer of the Navy, located at the U.S. Naval Observatory. The mission of this Division is to coordinate and execute the Oceanographer of the Navy functions related to policy and programs involving international and/or interagency oceanography. Oceanography includes meteorology, oceanography, mapping, charting and geodesy, astronomy, and precise time and time interval.

Location: Stennis Space Center, Mississippi
Embedded Liaison: LTJG Laura Dwyer, NOAA Commissioned Officer Corps

Embedded in the Navy's Naval Oceanography Mine Warfare Center, LTJG Laura Dwyer works side by side with Navy officers operating Unmanned Underwater Vehicles worldwide and is currently stationed at Stennis Space Center. This collaboration will provide knowledge and experience that will keep NOAA on the cutting edge of this emerging technology as well as strengthen the partnership between NOAA and the Navy.

Department of Homeland Security - U.S. Coast Guard

Location: Washington, DC

Embedded Liaison: CDR G. Mark Miller, NOAA Commissioned Officer Corps

As the NOAA liaison to the United States Coast Guard (USCG), CDR Miller maintains a current and comprehensive knowledge of interagency activities and policies related to the USCG and NOAA. He identifies potential conflicts or benefits issues for analysis and evaluation, conducts appropriate assessments and studies, and serves as the interface between NOAA and the USCG. CDR Miller initiates, designs, and implements strategies through federal agency liaison and coordination that results in cooperative arrangements for maritime security, oceanographic research, hazardous materials spill response, and many other activities.

Teacher at Sea Program

The mission of the Teacher at Sea (TAS) program is to give teachers a clearer insight into our ocean planet, a greater understanding of maritime work and studies, and to increase their level of environmental literacy by fostering an interdisciplinary research experience. The program provides a unique environment for learning and teaching by sending kindergarten through college-level teachers to sea aboard NOAA research and survey ships to work under the tutelage of scientists and crew. Then, armed with new understanding and experience, teachers bring this knowledge back to their classrooms. Since its inception in 1990, the program has enabled more than 600 teachers to gain first-hand experience of science and life at sea. By participating in this program, teachers enrich their classroom curricula with knowledge that can only be gained by living and working side-by-side, day and night, with those who contribute to the world's body of oceanic and atmospheric scientific knowledge. Below is a list of the NOAA Teachers at Sea for the current monthly update for the 2016 Field Season. Once they have embarked on their cruise, you can gain access to their blogs which document their missions at sea and offer a wealth of information about the research being conducted as well as personal stories.

- Teacher In FY 16 NOAA's Teacher at Sea Program sent 13 teachers to sea, and supported 36 Teacher at Sea Events.

- Advertising for FY17 Teacher at Sea season is open; online application available from November 1-30.
    - NOAA Teacher at Sea Facbook reach for online application is 56,000+ and 320+ shares.

OMAO - NOAA Dive Program

OMAO manages and implements NOAA's Dive Program (NDP), which trains and certifies scientists, engineers, and technicians from federal, state, tribal governments, and the private sector to perform the variety of tasks carried out underwater to support NOAA's mission. NDP also has cooperative diving agreements with over 100 government agencies and academic institutions. NOAA has more than 400 divers who perform over 14,000 dives per year. The NDP is headquartered at the NOAA Diving Center at the NOAA Western Regional Center in Seattle, Washington.

During the Physicians Training in Diving Medicine Course (co-taught by the Undersea and Hyperbaric Medical Society and the National Oceanic and Atmospheric Administration (NOAA)), medical professionals get to experience what it is like to do a commercial-type dive.
[Photo: Aitana de la Jara/NOAA]

OMAO Small Boat Program

OMAO manages NOAA's Small Boat Program and sets policy and provides safety inspections for almost 400 small boats operated by the various Line and program offices throughout NOAA, which support fisheries laboratories, dive support, nautical charting, ocean and Great Lakes research, and more.

NOAA small boats support many diverse operations across the country.
[Photos: NOAA]

Office of Marine and Aviation Operations

Providing Environmental Intelligence for a Dynamic World

The personnel, ships, and aircraft of NOAA play a critical role in gathering environmental data vital to the nation's economic security, the safety of its citizens, and the understanding, protection, and management of our natural resources. The NOAA fleet of ships and aircraft is managed and operated by the Office of Marine and Aviation Operations (OMAO), an office comprising civilians, mariners, and officers of the NOAA Commissioned Officer Corps, one of the seven uniformed services of the United States. NOAA's roots trace back to 1807, when President Thomas Jefferson ordered the first comprehensive coastal surveys. Those early surveys ensured safe passage of ship-borne cargo for a young nation. As the needs of the nation have grown, so too have OMAO's responsibilities. Today, OMAO civilians and NOAA Corps officers operate, manage, and maintain NOAA's active fleet of 16 research and survey ships and nine specialized aircraft. Together, OMAO and the NOAA Corps support nearly all of NOAA's missions.

NOAA has the largest fleet of federal research and survey ships in the nation. The fleet ranges from large oceanographic ships capable of exploring and charting the world's deepest ocean, to smaller vessels responsible for surveying the shallow bays and inlets of the United States. The fleet supports a wide range of marine activities including fisheries surveys, nautical charting, and ocean and climate studies. Based throughout the continental United States, Alaska, and Hawaii, the ships operate in all regions of the nation and around the world.

NOAA's aircraft provide a wide range of airborne capabilities. Our highly specialized Lockheed WP-3D "Hurricane Hunter" aircraft are equipped with an unprecedented variety of scientific instrumentation, radars, and recording systems for both in situ and remote sensing measurements of the atmosphere, the Earth, and its environment. Equipped with both C-band weather radar and X-band tail Doppler radar systems, the WP-3Ds have the unique ability to conduct tropical cyclone research in addition to storm reconnaissance. Together with NOAA's Gulfstream IV-SP hurricane surveillance jet, these aircraft greatly improve our physical understanding of hurricanes and enhance the accuracy of tropical cyclone forecasts. NOAA's light aircraft also play a vital role in monitoring our environment. Our King Air, Commander and Twin Otter aircraft support marine mammal population studies, shoreline change assessments, oil spill investigations, and water resource/snowpack surveys for spring flood forecasts.

The NOAA fleet provides immediate response capabilities for unpredictable events. For example, in November 2014, our aircraft flew missions over upstate New York after the record snow falls of up to seven feet and conducted airborne Snow Water Equivalent (SWE) and soil moisture measurements. Airborne SWE measurements are used by NOAA's National Weather Service when issuing river and flood forecasts, water supply forecasts, and spring flood outlooks.

After Hurricane Sandy in 2012, NOAA ships Thomas Jefferson and Ferdinand R. Hassler conducted emergency bathometric surveys to locate possible submerged navigational hazards in the ports of New York and Virginia. These surveys enabled the ports to reopen quickly. Aerial images of storm-stricken regions, taken by NOAA aircraft, helped residents and emergency workers to quickly assess the condition of houses, bridges, and vital infrastructure. In 2010, the NOAA fleet and the NOAA Corps played a major role in the response to the BP Deepwater Horizon oil spill. NOAA's entire Atlantic fleet and over a quarter of the total strength of the NOAA Corps were deployed to the Gulf following the spill, developing mission plans and assisting response efforts.

While manned aircraft and sea-going vessels have been, and will continue to be, a primary source of environmental data, new technology will have a significant role to play in the future NOAA fleet. OMAO, in coordination with other NOAA offices and federal agencies, is evaluating and deploying remotely piloted underwater and aircraft systems that could significantly contribute to environmental observations. OMAO's ongoing challenge is to meet the growing demand for in situ scientific data while providing the highest level of service. To better serve the needs of the nation, NOAA is examining the composition of the fleet through an exhaustive and critical review of at-sea science and observation requirements. Our objective is to develop a clear, cost-efficient path forward to ensure that the NOAA fleet can continue to conduct at-sea surveys and research vital to fisheries management, updating nautical charts, responding to natural and manmade disasters, and understanding coastal and marine systems more fully. Meeting these requirements is essential to developing sustainable, science-based management and conservation plans that protect the health and resiliency of these resources over the long-term.

We continue our efforts to build a civilian and NOAA Corps officer work force that is uniquely qualified to gather critical environmental intelligence and be adaptive and responsive to a changing world and work to expand our partnerships with other federal agencies. For example, NOAA Corps officers are currently assigned to work in the Department of Defense, National Science Foundation, and the U.S. Senate among others where they lend their expertise and service. We also continue to strengthen our partnership with the U.S. Coast Guard. Our basic NOAA Corps officer training class is held at the U.S. Coast Guard Academy, where newly commissioned officers train alongside Coast Guard officer candidates, developing skills and professional relationships that will benefit both services, especially during challenging times. Active collaboration among the Federal family is critical to ensuring the long-term capability and success of the federal ocean infrastructure. Our partners' success is our success. The men and women of OMAO and the NOAA Corps provide environmental intelligence for a dynamic world as they serve our nation every day from the farthest seas to the highest skies.

NOAA Commissioned Officer Corps

– Honor, Respect, Commitment –

The NOAA Commissioned Officer Corps (NOAA Corps) is one of the United States' seven Uniformed Services and as commissioned officers serve with the 'special trust and confidence' of the President. NOAA Corps officers are an integral part of the National Oceanic and Atmospheric Administration (NOAA), an agency of the U.S. Department of Commerce. With an authorized strength of 321 officers, the NOAA Corps serves throughout the agency's Line and Staff Offices to support nearly all of NOAA's programs and missions. The combination of commissioned service and scientific expertise makes these officers uniquely capable of leading some of NOAA's most important initiatives.

The NOAA Corps is part of NOAA's Office of Marine and Aviation Operations (OMAO) and traces its roots back to the former U.S. Coast and Geodetic Survey, which dates back to 1807 and President Thomas Jefferson. In 1970, NOAA was created to develop a coordinated approach to oceanographic and atmospheric research and subsequent legislation converted the commissioned officer corps to the NOAA Corps. The NOAA Corps today provides a cadre of professionals trained in engineering, earth sciences, oceanography, meteorology, fisheries science, and other related disciplines. Corps officers operate NOAA's ships, fly aircraft, manage research projects, conduct diving operations, and serve in staff positions throughout NOAA.

Benefits of the NOAA Corps to the Nation

The combination of commissioned service with scientific and operational expertise, allows the NOAA Corps to provide a unique and indispensable service to the nation. Discipline and flexibility are inherent in the NOAA Corps personnel system. Officers are trained for positions of leadership and command in the operation of ships and aircraft; in the conduct of field projects on land, at and under the sea, and in the air; in the management of NOAA observational and support facilities; as members or leaders of research efforts; and in the management of various organizational elements throughout NOAA. NOAA Corps officers must be technically competent to assume positions of leadership and command in NOAA and Department of Commerce programs and in the Armed Forces during times of war or national emergency. NOAA Corps officers enable NOAA to fulfill mission requirements, meet changing environmental concerns, take advantage of emerging technologies, and serve as environmental first responders.

- In 2015, NOAA aircraft conducted research and surveillance missions into some of the planet's most extreme weather, ranging from Hurricane Patricia, the strongest on record in the Western hemisphere, to severe storms over the U.S. Great Plains region. In addition, NOAA aircraft responded to unprecedented flooding in South Carolina using advanced sensors and imaging technology to provide emergency response managers with critical real-time information needed to respond to this disaster.
- In 2015, several ships conducted monitoring of an extensive harmful algal bloom (HAB) extending from California to the Gulf of Alaska. The 2015 HAB was the largest in more than a decade, affecting sea birds, sea lions, and triggered closures of commercial shellfish fisheries along the U.S. west coast. Observations help scientists understand HABs and help predictive modeling for the future.
- After Hurricane Sandy in 2012, NOAA Ships *Thomas Jefferson* and *Ferdinand R. Hassler* conducted emergency bathometric surveys to locate possible submerged navigational hazards in the ports of New York and Virginia. These surveys enabled the ports to reopen quickly. Aerial images of storm-stricken regions, taken by NOAA aircraft, helped residents and emergency workers to quickly assess the condition of houses, bridges, and vital infrastructure.
- After Hurricane Irene in 2011, the NOAA Ship *Ferdinand Hassler* and team completed 300 lineal nautical miles of survey work in less than 48 hours providing a damage assessment that enabled the U.S. Coast Guard to reopen ports and restore more than $5M per hour in maritime commerce less than three days after the storm.
- In 2010, the NOAA fleet and the NOAA Corps played a major role in the response to the BP Deepwater Horizon oil spill in the Gulf of Mexico. NOAA's entire Atlantic fleet and over a quarter of the total strength of the NOAA Corps were deployed to the Gulf following the spill, developing mission plans and assisting response efforts.